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(12) **United States Patent**
Wakim et al.

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(54) **SYSTEM AND METHOD AND TRAFFICKING TELECOMMUNICATION SIGNALS**

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 U.S.C. 154(b) by 0 days.

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(52) **U.S. Cl.** 370/466; 370/907

(58) **Field of Search** 370/465, 401,
 370/466, 539, 467, 538, 542, 543, 907;
 359/135

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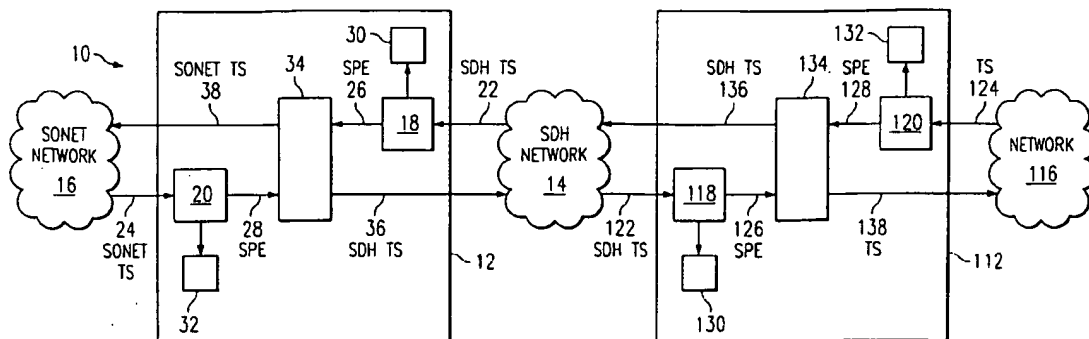
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(57) **ABSTRACT**

A method of trafficking telecommunication signals having
 various formats, includes providing, at a first network
 element, a synchronous payload envelope having a first
 format, the synchronous payload envelope comprising a
 synchronous path and associated overhead portion and a
 payload portion, mapping the synchronous payload enve-
 lope into a transport signal having a second format without
 terminating the synchronous path or associated overhead
 portion of the synchronous payload envelope, and transmit-
 ting the transport signal to a second network element over a
 network supporting the second format.

18 Claims, 4 Drawing Sheets





US006704326B2

(12) **United States Patent**
Russell et al.

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(54) **PAYLOAD MAPPING IN SYNCHRONOUS NETWORKS**

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(65) **Prior Publication Data**

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Related U.S. Application Data

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(52) **U.S. Cl.** 370/466; 370/907; 370/365

(58) **Field of Search** 341/50, 55, 61, 341/95; 370/474, 476, 498, 902, 903, 905, 907, 912, 914, 916, 442, 445, 464, 465, 466, 469, 470, 471, 472, 503, 509, 510, 536, 537

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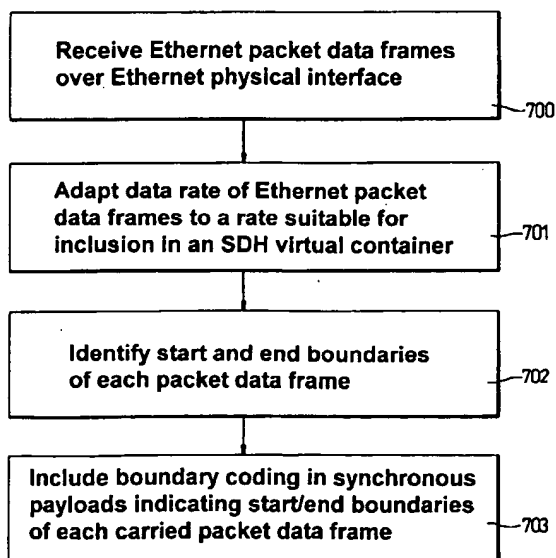
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(57) **ABSTRACT**

There is disclosed a method of carrying frame based data, eg Ethernet data, over a synchronous digital hierarchy network in order to provide local area network type functionality over a wide area network coverage. Specific embodiments disclose methods of mapping Ethernet data frames into SDH virtual containers, and distinguishing start and end boundaries of the Ethernet data frames within the virtual container payloads, by a selection of encoding methods including a segmentation, pointer methods, bit stuffing methods and byte stuffing methods. Data frames are encoded with a code which designates a boundary of each frame, and the encoded frames are input into a synchronous data channel.

19 Claims, 15 Drawing Sheets





US006496519B1

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Russell et al.

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(45) Date of Patent: ***Dec. 17, 2002**

(54) **FRAME BASED DATA TRANSMISSION
OVER SYNCHRONOUS DIGITAL
HIERARCHY NETWORK**

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(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(58) Field of Search **370/222, 258,**
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542, 541, 539

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(57) **ABSTRACT**

A frame based data communications network is interfaced to a synchronous digital hierarchy network via a plurality of frame based data port cards incorporated into a plurality of synchronous multiplexers. Each port card comprises a conventional frame based data port, a frame switch, a rate adapter means and a mapping means for mapping data frames into a plurality of SDH virtual containers. Frame based data is incorporated directly into a synchronous virtual container without encapsulation in an intermediate protocol. A number of topologies of a frame based data channel network are possible, overlaid on the underlying synchronous transport network, including an open loop topology, a ring mode topology, and a backhaul topology.

24 Claims, 11 Drawing Sheets

